

# ABSTRACT

1       An apparatus for thermal conversion of one or more reactants to desired end  
2 products includes an insulated reactor chamber having a high temperature heater such as a  
3 plasma torch at its inlet end and, optionally, a restrictive convergent-divergent nozzle at  
4 its outlet end. In a thermal conversion method, reactants are injected upstream from the  
5 reactor chamber and thoroughly mixed with the plasma stream before entering the reactor  
6 chamber. The reactor chamber has a reaction zone that is maintained at a substantially  
7 uniform temperature. The resulting heated gaseous stream is then rapidly cooled by  
8 passage through the nozzle, which "freezes" the desired end product(s) in the heated  
9 equilibrium reaction stage, or is discharged through an outlet pipe without the  
10 convergent-divergent nozzle . The desired end products are then separated from the  
11 gaseous stream.